IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

GODO KAISHA IP BRIDGE 1,	§	
	§	
Plaintiff,	§	
	§	
v.	§	No. 2:17-CV-00676-RWS-RSP
	§	
INTEL CORPORATION,	§	
	§	
Defendant.	§	

CLAIM CONSTRUCTION OPINION AND ORDER

This lawsuit concerns eight United States patents relating to semiconductor technology: U.S. Patents 6,197,696; 6,346,736; 6,387,824; 6,602,802; 6,709,950; 6,967,409; 7,279,727; and RE 41,980. The parties have agreed to constructions for certain terms from six of these patents. *See* Part II *infra*.

Terms from three of the patents remain disputed. The ’736 Patent, titled “Trench Isolated Semiconductor Device,” discloses a device with a dielectric film between the wiring and substrate of a semiconductor to reduce the capacitance between them. The ’824 Patent and ’802 Patent teach methods of forming wiring structures using a porous film between the wiring, which also reduces internal capacitance of the device. The lower the capacitance between the wiring and the substrate (in the case of the ’736 Patent) and the wiring in the devices (in the case of the ’824 and ’802 Patents), the higher the operating speed.

I. GENERAL LEGAL STANDARDS

A. Claim Construction

"[T]he claims of a patent define the invention to which the patentee is entitled the right to exclude." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). As such, if the parties dispute the scope of the claims, the court must determine their meaning. *See, e.g.*, *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996), *aff'g*, 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc); *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1317 (Fed. Cir. 2007).

When construing claims, "[t]here is a heavy presumption that claim terms are to be given their ordinary and customary meaning." *Aventis Pharm. Inc. v. Amino Chems. Ltd.*, 715 F.3d 1363, 1373 (Fed. Cir. 2013) (citing *Phillips*, 415 F.3d at 1312–13). Courts must therefore "look to the words of the claims themselves . . . to define the scope of the patented invention." *Id.* (citations omitted). The "ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Phillips*, 415 F.3d at 1313. This "person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.*

Intrinsic evidence is the primary resource for claim construction. *See Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1348 (Fed. Cir. 2010) (citing *Phillips*, 415 F.3d at 1312). For certain claim terms, "the ordinary meaning of claim language as understood

by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314. But for claim terms with less-apparent meanings, courts consider "those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean . . . [including] the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Id.*

II. AGREED CONSTRUCTIONS

The parties agree to the following constructions, which the Court hereby adopts. Joint Cl. Constr. & Prehearing Statement [Dkt. # 85] at 2–3; Notice of Supplement to Joint Cl. Constr. Statement [Dkt. # 103].

Claim Term	Agreed Construction
using the [first resist pattern/second resist pattern and the mask pattern/patterned third insulating film] as a mask ('696 Patent, cl.13)	using the [first resist pattern/second resist pattern and the mask pattern/patterned third insulating film] to define areas for etching
step order ('696 Patent, cl.13)	steps (a)–(k) must be performed in the order listed.
interlayer insulating film ('980 Patent, cl.18, 33, 35, 50)	an insulating film located between but not within layers
small dielectric constant ('980 Patent, cl.18, 35)	a dielectric constant not greater than that of silicon dioxide

said bonding pad in said opening and said second dielectric film of said surface protecting film completely cover said first dielectric film so as not to expose said first dielectric film ('980 Patent, cl.18)	the bonding pad and the second dielectric film each covers a portion of the first dielectric film, and the bonding pad and the second dielectric film collectively cover the first dielectric film so that it is not exposed to above
wherein said bonding pad covers said opening ('980 Patent, cl.35)	plain and ordinary meaning
a surface protecting film ('980 Patent, cl.18, 35)	plain and ordinary meaning
a conductor pad which is provided on the gate interconnect part ('727 Patent, cl.10)	plain and ordinary meaning
wherein the gate contact is in contact with the conductor pad ('727 Patent, cl.10)	wherein the gate contact is physically touching the conductor pad
a second trench portion filled with an insulating material formed to separate a plurality of dummy semiconductor portions in said isolation region ('736 Patent, cl.6, 7, 11, 13, 14, 16)	plain and ordinary meaning
resistor film ('736 Patent, cl.13, 14, 16)	plain and ordinary meaning
forming . . . on ('950 Patent, cl.1, 17)	forming . . . directly or indirectly on
formed on ('409 Patent, cl.1, 25, 26, 64)	formed directly or indirectly on

III. CONSTRUCTION OF DISPUTED TERMS

A. "dielectric film" ('736 Patent, cl.6–8)

Godo Kaisha's Proposed Construction	Intel's Proposed Construction
plain and ordinary meaning	a dielectric film for reducing the capacitance between the wire and the substrate

FIG. 19 of the '736 Patent (see below) shows a prior-art trench-isolated semiconductor device having an active region (6) of a silicon substrate (1), a gate electrode (4), and source/drain regions (5). An isolation region (7) surrounds the active region (6) and includes multiple trench portions (8), each filled with a silicon oxide film. Semiconductor portions (9) are between the trench portions (8). A polysilicon wire (10) is on one trench portion (8). A gate oxide film (2) and gate electrode (4) are on the substrate (1) over the active region (6). An interlayer insulating film (12) covers the surface of the substrate (1), and a metal wire (13) is on the insulating film (12). '736 Patent at 1:35–51.

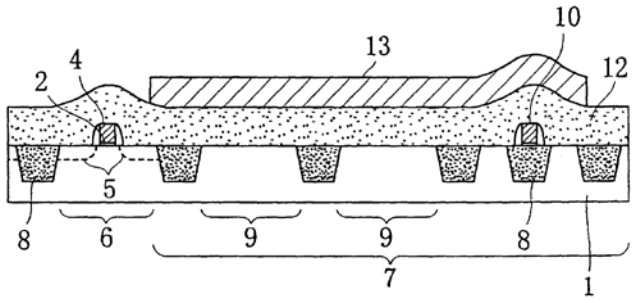

FIG. 19 of the '736 Patent

Generally, these types of trench-isolation techniques improve some operating characteristics relative to other devices, but tend to increase the wire-to-substrate capacitance because of the smaller distances between the wire (13) and substrate (1) in the regions

between the trenches (8). *See generally* '736 Patent at 2:48–3:24. These higher capacitances negatively affect operating speed. *Id.* at abst. ("What results is a semiconductor device having lower total wiring-to-substrate capacitance and a higher operating speed.").

To compensate, the '736 Patent teaches reducing the capacitance between the wiring and substrate, relative to the prior art, by interposing a dielectric film between the semiconductor portions (9) of the isolation region (7) and the interlayer insulating film (12). For example, FIG. 12 of the '736 Patent (see below) shows an underlying insulating film (81) made of a silicon oxide film formed over the semiconductor portions (9) and trench portions (8) of the isolation region (7). This insulating film (81) covers the polysilicon wire (10), which results in reduced capacitance between the wire (13) and substrate (1) relative to the wiring-to-substrate capacitances of the embodiment shown in FIG. 19. *Id.* at 23:2–33.

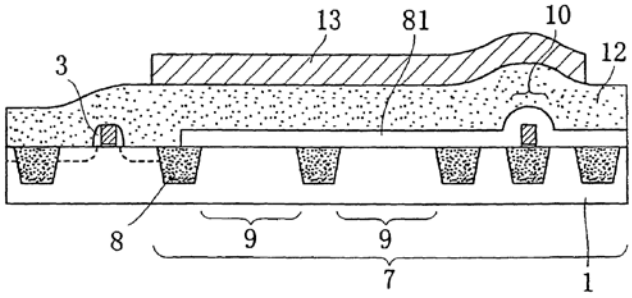

FIG. 12 of the '736 Patent

Claim 6 recites "a dielectric film" interposed between the dummy semiconductor portions (9) of the isolation region (7) and the interlayer insulating film (12). The parties agree that the "dielectric film" is the underlying insulating film (81) shown in FIG. 12, but dispute the proper construction for the term.

Intel argues "the claimed 'dielectric film' must be able to reduce the capacitance between the claimed 'wire' and 'substrate' layers." Def.'s Resp. [Dkt. # 106] at 25. "[T]hat ability constitutes the purported inventive aspect of the claims," *id.*, which warrants the inclusion of the purpose of the dielectric film in the Court's construction. Godo Kaisha argues (1) the patentee never expressed an intent to depart from the plain meaning of the term; (2) intent is not an element of patent infringement; and (3) Intel's proposed construction fails to make clear to what reference the capacitance must be reduced. Pl.'s Br. [Dkt. # 102] at 5–8.

The Court sees no compelling reason to adopt Intel's construction. Claim 6 covers structure rather than function or purpose. *See Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990) ("[A]pparatus claims cover what a device is, not what a device does."). The patentees clearly recited the limitation with only structural language using a term well known in the art. Moreover, there is no dispute about whether interposing the dielectric film reduces the capacitance between the wire and the substrate. *See* Hr'g Tr. [Dkt. # 137] at 51:21–23 (Intel's agreement that the correct comparison about whether the device reduces capacitance is to a device without dielectric film); *see id.* at 52:12–19 (Intel's agreement that, using that comparison, any dielectric film interposed as required by Claim 6 reduces the capacitance between the wire and the substrate). Thus, introducing a statement of intended purpose does not resolve any dispute over claim scope and unnecessarily complicates an otherwise straight-forward claim limitation.

Intel relies heavily on *Praxair, Inc. v. ATMI, Inc.*, 543 F.3d 1306 (Fed. Cir. 2008), which addressed the proper construction of "flow restrictor." The district court's construction merely required the flow restrictor "to restrict the rate of flow." *Praxair*, 543 F.3d at 1322–23. The appellate court, however, looked to the "fundamental object of the invention disclosed by the [asserted] patent specification" and concluded mere restriction of flow was not sufficient. *Id.* at 1324. The appellate court instead construed the term as "a structure that serves to restrict the rate of flow *sufficiently to prevent a hazardous situation*." *Id.* (emphasis added). Thus, *Praxair* addressed a dispute about claim scope—the degree to which the flow rate must be restricted by the structure.

Praxair is distinguishable for two reasons. First, the parties in *this* case have no dispute about the scope of "dielectric film" or the result of interposing the dielectric film in the manner recited by Claim 6. The parties, for example, agree the correct comparison for reduction of capacitance is to a device without dielectric film (as opposed to a device with a different dielectric film). Hr'g Tr. [Dkt. # 137] at 51:21–23. The parties also agree that, using that comparison, *any* dielectric film interposed as required by Claim 6 reduces the capacitance between the wire and the substrate. *See id.* at 52:12–19.

Second, in *Praxair*, the district court, the parties, and the appellate court all proposed or adopted constructions that included functional language. Both parties' initial constructions for "flow restrictor" included non-structural language. Praxair proposed "a structure in the form of a tube with multiple narrow passages *that exhibit capillary action and can*

restrict flow." Joint Cl. Constr. Statement [Dkt. # 90], No. 03-1158-SLR (D. Del) at 4 (emphasis added). ATMI proposed "an elongated cylindrical structure with at least two uniformly shaped bores . . . *such that friction significantly impedes the mass flow rate of gas through the bores*." *Id.* (emphasis added). Thus, the dispute was not *whether* to use non-structural language in the construction, but rather *which* non-structural language to use.

The Court rejects Intel's proposed construction as unnecessary. Moreover, because the Court sees no other dispute between the parties about the meaning of "dielectric film," the Court will not further construe the term at this time.

B. "form . . . a porous film" ('824 Patent, cl.3); "forming a porous film" ('802 Patent, cl.1–2)

Godo Kaisha's Proposed Construction	Intel's Proposed Construction
Plain and ordinary meaning. Alternatively, "form[ing] . . . a film having pores"	"form[ing] . . . a film with fine holes having a dielectric constant of 2 or less"

Like the '736 Patent, the '824 and '802 Patents disclose manufacturing methods that reduce capacitance between internal components of semiconductor devices to increase operating speed. '824 Patent at 1:18–20; '802 at Patent 1:23–25. Specifically, these patents teach achieving this result with a specific method of forming a porous film to be used as an inter-layer dielectric between wires. '824 Patent at 1:21–26; '802 Patent at 1:26–31.

The parties dispute the proper construction for "porous film." In arguing for a construction that includes "fine holes," Intel stresses that the specification uses that term 37 times to describe formation of the porous film. Def.'s Br. [Dkt. # 106] at 18. Moreover, the

specifications describe an "object of the present invention" as "allow[ing] the formation of a porous film having a dielectric constant of 2 or less in a simple process at low cost." '824 Patent at 2:18–21; *see also id.* at 1:26–28 ("[P]orous film is only the film capable of providing a dielectric constant of 2.0 or lower."). Intel claims these aspects of its construction provide needed objective anchors from the specification for the term. Def.'s Br. [Dkt. # 106] at 13–19. When the term is "a relative term of degree," says Intel, the Court should look to the specification for the proper benchmark. *Id.* at 17 (citing *Network-1 Sec. Sols., Inc. v. Cisco Sys., Inc.*, 632, 644 (E.D. Tex. 2010)).

The Court rejects Intel's proposed construction for three reasons. First, the Court is not convinced that "porous film" is a term of degree or that, even if it is, one of ordinary skill could not ascertain the scope of the claim from the specification. Porous films are well-known in the art. Indeed, the patents themselves recognize the use of porous film as interlayer dielectrics instead of then-conventional silicon oxide film. *See, e.g.*, '824 Patent at 1:23–26 (recognizing that porous film has been studied as a replacement for conventional silicon oxide film). Moreover, it is clearly from the claim language that the porous film is the output of the plasma process, and is thus somewhat self-defining. In other words, the porous film is the film created by the removal of the organic component of the organic-inorganic hybrid film.

Second, as for the dielectric constant, the patents describe Embodiment 6 as forming a porous film with a dielectric constant greater than 2 using the method. *See id.* at 12:29–33. The patent explains a lower dielectric constant is not necessary because there are no

metal wires in the layer to cause parasitic capacitance. *Id.* at 12:34–42. The same hydrogen plasma process operates on adjacent film to yield a dielectric constant of 1.7, and the different porosity is solely a function of the ratio of the organic to inorganic components of the two hybrid films. That is consistent with the object of the invention, which is to allow, but not necessarily require, formation of a porous film having a dielectric constant of 2. *Id.* at 2:18–21. The patents' use of "porous film" in this manner rebuts any implication that the patentees defined "porous film" as only film having a dielectric constant of 2 or less. [1]

Third, although the patents repeatedly use "fine holes" to describe the process of creating the porous film, there is no suggestion or support for the notion that all porous film has "fine holes." Moreover, the Court does not see how "fine holes" provides the objective anchor that Intel claims is necessary, as the dispute then shifts to the meaning of "fine" and "holes."

Having rejected Intel's proposed construction, the Court affirms its preliminary position that no further construction is necessary for this term.

C. step order ('824 Patent, claim 3)

Godo Kaisha's Proposed Construction	Intel's Proposed Construction
The claimed steps do not need to be performed in the order recited.	All steps in claim 3 must be performed in the order recited in the claim.

[1] The patents' statement that "the porous film is only the film capable of providing a dielectric constant of 2.0 or lower" is problematic for Plaintiff. In the end, however, the Court concludes this awkward language stems from the translation of the earlier-filed Japanese applications to which the '824 and '802 Patents claim priority. The Court believes the patentees intended to note that only porous film, and not conventional silicon oxide film, will allow for a dielectric constant of 2.0 or less. This harmonizes with the description in Embodiment 6 of a porous film having a constant of 2.3.

Generally, "a claim requires an ordering of steps when the claim language, as a matter of logic or grammar, requires that the steps be performed in the order written, or the specification directly or implicitly requires an order of steps." *See Mformation Techs., Inc. v. Research in Motion Ltd.*, 764 F.3d 1392, 1398 (Fed. Cir. 2014) (internal quotation marks omitted). That is at least partially the case here.

Claim 3 recites the steps of:

> [(a)] depositing, on a substrate, an organic-inorganic hybrid film having a siloxane skeleton;
>
> [(b)] patterning said organic-inorganic hybrid film to *form a wire groove* in said organic-inorganic hybrid film;
>
> [(c)] filling a metal film in *said wire groove* to *form a buried wire* composed of said metal film; and
>
> [(d)] performing a plasma process using a plasma derived from a gas containing a reducing gas with respect to said organic-inorganic hybrid film to form an inter-layer dielectric which is a porous film composed of said organic-inorganic hybrid film.

'824 Patent at 15:32–16:9 (emphasis added). Clearly, (b) must come before (c) because a wire groove cannot be filled unless it has first been formed. And clearly (a) must come before (b) because the hybrid film must be deposited before it can be patterned and a wire groove formed in it.

As for step (d), Intel argues the step converts the organic-inorganic hybrid film into a porous film, after which there is no hybrid film on which the other steps can operate. H'rg. Tr. [Dkt. # 137] at 117:10–24. Thus, says Intel, step (d) must come last.

The Court disagrees for three reasons. First, the specification clearly discloses embodiments that perform the plasma process before filling the metal groove. *See*, *e.g.*, *id.* at 11:3–17; *id.* at 11:59–12:28. Thus, step (d) can be performed at least before step (c). Second, nothing in the claim language suggests there is no hybrid film on which to operate after step (d). To the contrary, step (d) recites its continued existence: "a porous film *composed of said organic-inorganic hybrid film*." '824 Patent at 16:8–9. Third, the Court discerns no technical reason from the specification as to why step (d) must happen after step (b).

The Court affirms its preliminary construction. The first three steps of this claim must be performed in the recited order, but the "performing" step can happen any time after the "depositing" step.

D. step order ('802 Patent, cl.1)

Godo Kaisha's Proposed Construction	**Intel's Proposed Construction**
The claimed steps do not need to be performed in the order recited.	All steps in claim 1 must be performed in the order recited in the claim.

Claim 1 of the '802 Patent recites

> (a) depositing, on a substrate, an organic-inorganic hybrid film having a siloxane skeleton; and
>
> (b) forming a porous film composed of said organic-inorganic hybrid film.

Godo Kaisha argues the '802 Patent discloses performing both steps concurrently and that nothing in the claim language requires ordering the steps. Pl.'s Br. [Dkt. # 102] at 22–23

(citing ’802 Patent 2:36–47).

The Court disagrees. The passage cited by Godo Kaisha summarizes both Embodiment 1, which uses plasma-enhanced CVD for deposition on the substrate and a hydrogen reducing gas, and Embodiment 3, which uses plasma enhanced CVD for deposition on the substrate and an ammonia reducing gas. *See* ’802 Patent at 3:42–44.[2] The specification describes both embodiments as “first” depositing an organic-inorganic hybrid film on a substrate using plasma enhanced CVD, *id.* at 6:55–65; *id.* at 9:1–5, and “subsequently” or “next” performing a plasma process to decompose the organic component, *id.* at 7:7–15; *id.* at 9:6–14. Further, forming the porous film first would obviate any need to then deposit an organic-inorganic hybrid film on the substrate, as the porous film would be deposited directly on the substrate instead.

The Court affirms its preliminary construction: The steps of Claim 1 must be performed in the recited order.

IV. ORDER

The Court **ORDERS** that each party must not refer, directly or indirectly, to its own or any other party’s claim construction positions in the presence of the jury. Likewise, the Court **ORDERS** the parties to refrain from mentioning any part of this opinion, other than the actual positions adopted by the Court, in the presence of the jury. Any reference to

[2] Embodiment 2 uses a thermal (rather than plasma) process to form the porous film. ’802 Patent at 8:31–36. Embodiment 4 does not use a plasma enhanced CVD process to deposit the siloxane skeleton. Embodiments 5–7 relate to forming a wiring structure and therefore are not relevant to determining the order of steps for Claim 1.

claim construction proceedings is limited to informing the jury of the positions adopted by the Court.

SIGNED this 12th day of September, 2018.

ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE